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Automated Methodology Combining Assessments and Developing Solutions about Interaction

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Abstract

In this article is solved development of the automated method of integration and processing the received diverse assessments and development the variants of managerial decisions for a large company's interaction with partners, aimed to increase of interaction effectiveness and to allow reduce costs and risks.

Keywords: Natural monopoly, interaction index, effectiveness ratio

1. Introduction

The basic idea of a company's diverse indexes integration is the following.

Let's suppose that there is a totality of diverse indexes $k_1, k_2, ..., k_n$ of the considered enterprise P_m. Let's collate a point in Euclidean space $\mathbf{R}^n$ of n dimension to the totality of indexes $k_1, k_2, ..., k_n$ according to the following rule:

$$k_1, k_2, ..., k_n \mapsto P(k_1, k_2, ..., k_n) \in \mathbf{R}^n$$

If all indexes $k_1, k_2, ..., k_n$ are normalized, i.e. they satisfy inequalities $0 \le k_i \le 1$, $i = 1,2,...,n$, then a point $P(k_1, k_2, ..., k_n)$ from unit n-dimensional cube $E^n = \{(x_1, x_2, ..., x_n) \mid 0 \le x_i \le 1,\ i = \overline{1,n}\}$ in Euclidean space $\mathbf{R}^n$ will correspond to a set of indexes $k_1, k_2, ..., k_n$.

2. The N-dimensional conception of combining assessments

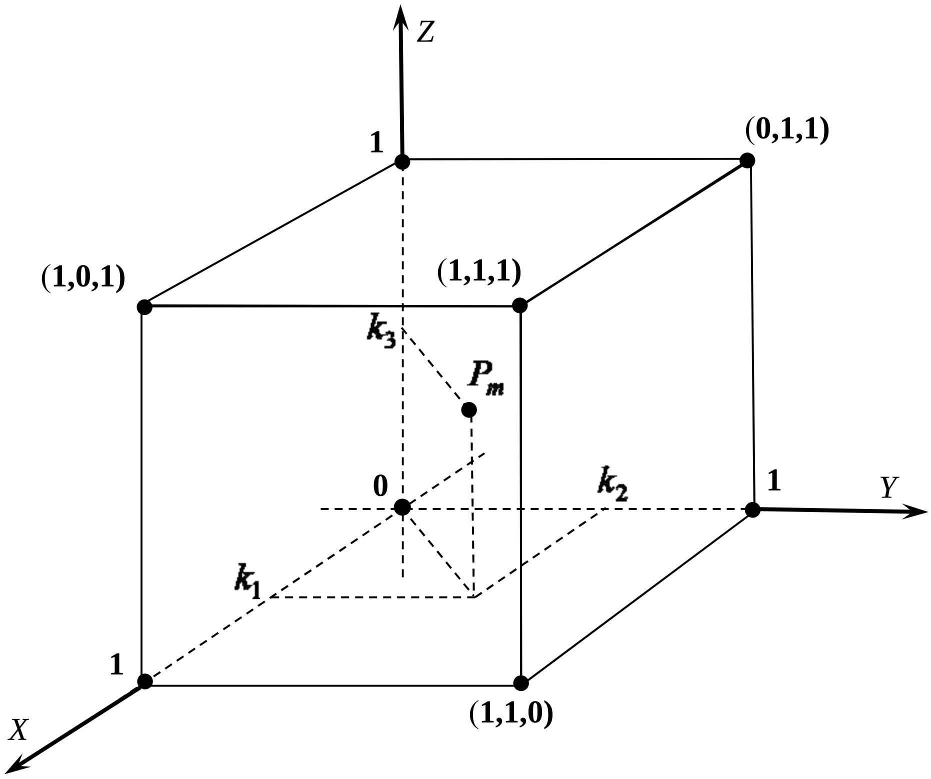


Fig. 1. Location of the estimated enterprise P_m in the unit cube.

In the three-dimensional case, when a group of the estimated parameters of the enterprise consists of three indicators (as, for example, it was obtained in [1] –

triple evaluations $(\Phi_i, k_{st}^i, k_{\text{pr}}^i)$), these comparison

$k_1, k_2, k_3 \mapsto P(k_1, k_2, k_3) \in \mathbf{R}^3$ can be illustrated by Figure 1.

Then let's perform the directed coloring of points inside and on the bounder of the unit cube in several colors. The color of the point $P_m(k_1, k_2, ..., k_n)$ will be automatically assigned to the enterprise P_m and it will be a required integral assessment of the enterprise.

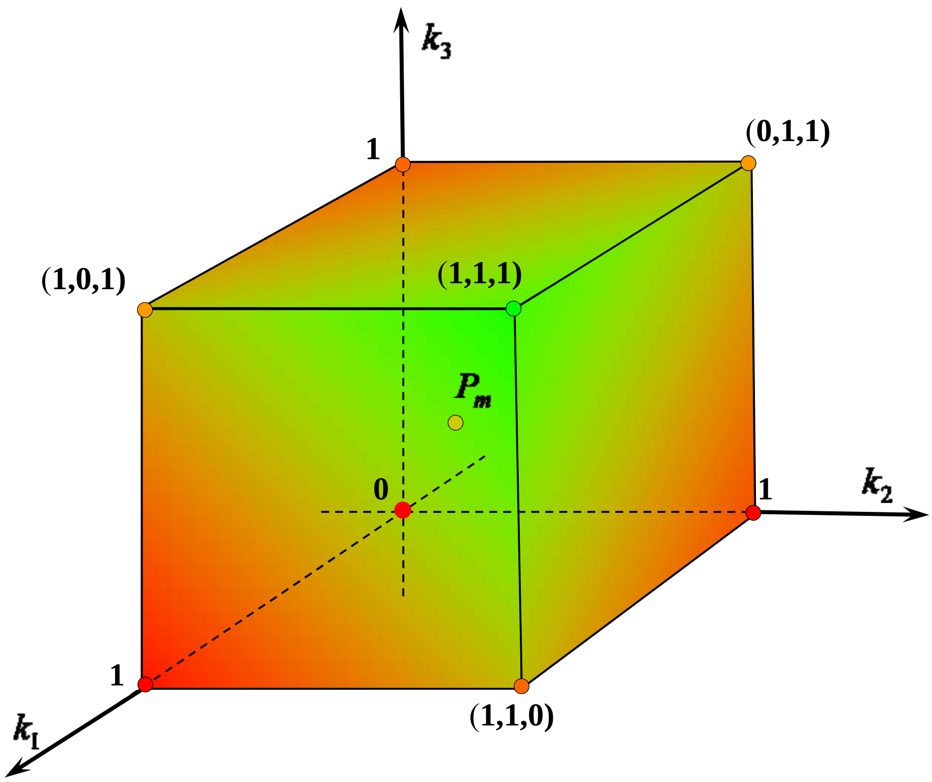


Fig. 2. Coloring of interior of the unit cube E_3 according to the extent of the points accessibility

For illustrative purposes of the proposed visualization let's set up the following colors and their traditional interpretation for inner regions of the cube:

The red one means that the enterprise is low-quality , the assessment is bad and interaction with the enterprise of this color is impossible. The yellow one means that the enterprise is middle-quality and it is possible to interact with it with some caution. The green one means that the enterprise is high-quality and interaction with the enterprise of this color is acceptable and perspective.

In order to obtain such a coloring of the unit cube and to visualize integral color assessment $0 \le T \le 1$ it is proposed to use a common standard palette RGB. In our case, it is sufficient to use two primary colors – the red and the green one;

the intermediate yellow color and its shades is obtained by adding red and green colors in specified percentage ratio. According to the RGB standard brightness of each primary color may vary from 0 to 255 (conventional units of brightness). For coloring points of the cube E_n let's assume that B=0, i.e. the blue color in painting points of cube is absent. The ratio of red and green colors changes continuously from values R=0, G=255 at the point (0, 0,…, 0) (pure red color at the coordinate origin) to values R=0, G=255 (pure green color) at "the best" vertex of the cube with coordinates (1, 1,…, 1). The percentage ratio $T(x_1, x_2, ..., x_n) \cdot 100\%$ of red and green colors of internal points $(x_1, x_2, ..., x_n)$ of the unit cube E_n is calculated as the ratio of the distance from coordinate origin to the point $(x_1, x_2, ..., x_n)$ to the length of the main diagonal of n-dimensional unit cube:

$$T = \frac{\sqrt{x_1^2 + x_2^2 + ... + x_n^2}}{\sqrt{n}} \cdot 100\%$$

For example, the middle $(\frac{1}{2}, \frac{1}{2}, ..., \frac{1}{2})$ of the main diagonal of the cube has percentage ratio of red and green colors $T = 50\%$ and color characteristics RGB are: R=255, G=255, B=0, i.e. the pure yellow color.

An example of coloring three-dimensional unit cube E_3 and color assessment of the enterprise P_m are shown at the fig. 2.

3. The flat conception of combining assessments

In case of large dimensions for convenient perception of color assessments it is proposed to dispose color points P_m corresponding to enterprises on the color strip in the places that have the same color. A color strip of "acceptability" and placement of the color point P_m are shown at the fig.3.

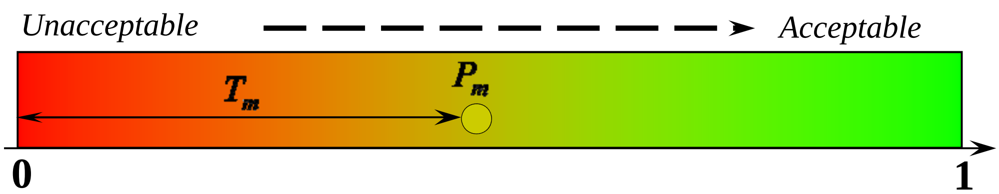
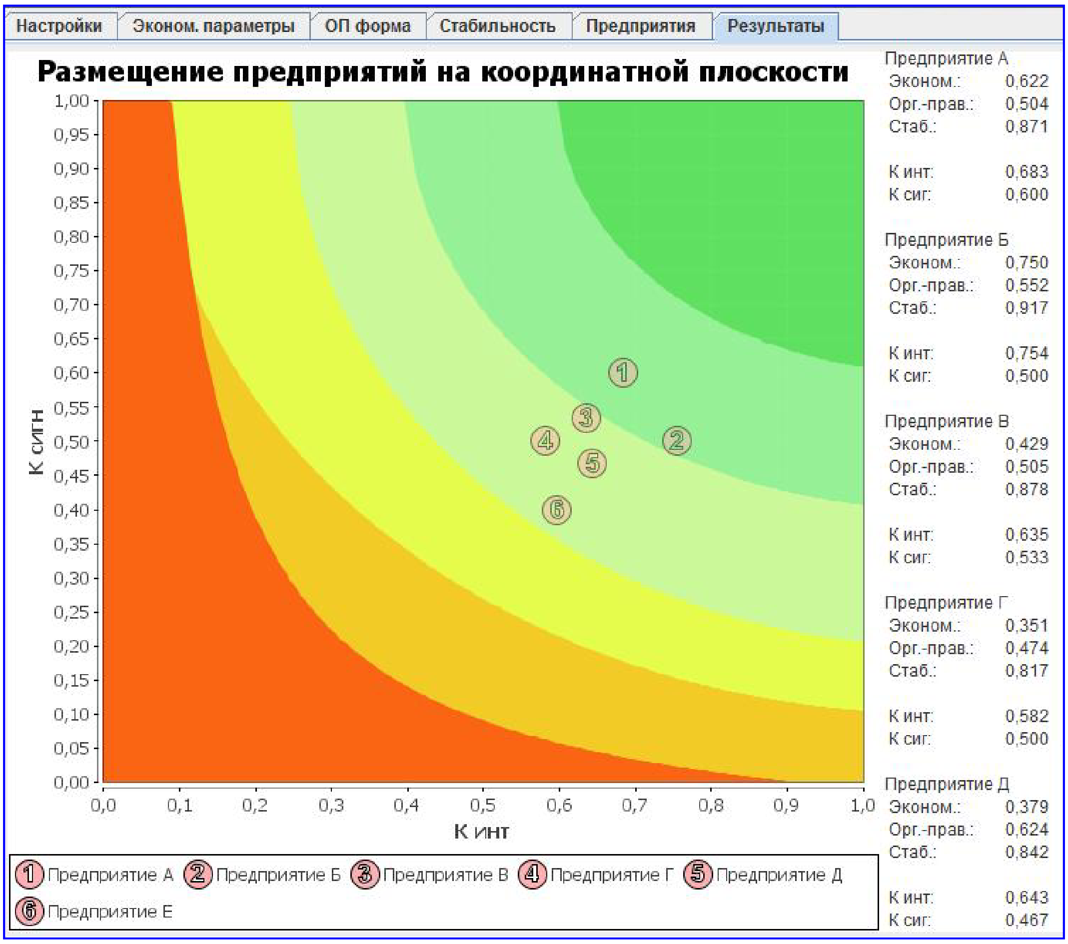


Fig. 3. Coloring of the strip of the "acceptability" and location of the point P_m on it

It is obvious that if the color assessments are implemented to several enterprises $P_1, P_2, ..., P_s$, then location of the corresponding points on the strip of acceptability will allow to compare enterprises $P_1, P_2, ..., P_s$ to each other and to choose the most suitable for cooperating one. The righter the enterprise P_m on the strip of acceptability is, the better quality on the entire set of considered parameters $k_1, k_2, ..., k_n$ it is.



As an example let's present a figure, visualizing the company's assessment of two different indexes. In this case points of the enterprise will be located on a two-dimensional plane.

The points of the plane with coordinates $(\Phi_i, k_{\text{pr}}^i)$ - values of the company's economic attractiveness and the degree of confidence to the enterprise – correspond to the evaluating enterprises. All these points are in the unit square because of normalization of assessments.

The unit square on the basis of company's working experience is preliminary painted to color zones of acceptability – all enterprises are shared to categories according to their economic attractiveness and the degree of confidence. Each category of enterprises has in correspondence preliminary formulated interpretation of color assessment which in fact is the formulation of the proposed to implementation managerial decision. A color that the point P_i gets is the final company's P_i assessment and the managerial decision is formulated on its base. According to the fig.4, the enterprise (1) is the most acceptable for cooperation.

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